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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,824	02/04/2005	Shigeru Yamago	2005-0118A	4007

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EXAMINER

BERNSHTEYN, MICHAEL

ART UNIT PAPER NUMBER

1713

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/523,824	Applicant(s) YAMAGO ET AL.	
	Examiner Michael Bernshteyn	Art Unit 1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 10 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-22 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-4, 10 and 11 in the reply filed on June 9, 2006 is acknowledged. The traversal is on the ground(s) that the Examiner has failed to cite any reference, which indicates that any of the present claims fails to define over the prior art. Therefore, the presumption is that the inventions of Group I-III do have the same or corresponding special technical features. This is not found persuasive because the special technical feature of Group I claims is an organotellurium compound, the special technical feature of Group II claims is a process for producing a living radical polymer, and the special technical feature of Group III claims is a block copolymer. Therefore unity of invention is lacking

The requirement is still deemed proper and is therefore made FINAL.

2. In view of remarks Examiner agrees to include claim 8 in Group III and claim 20 in Group II as the non-elected subject matter.
3. Claims 1-4, 10 and 11 are active.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 3 recites the limitation "obtainable" in the line 2. There is insufficient antecedent basis for this limitation in the claim.

The claim is indefinite if undue experimentation is involved to determine boundaries of protection. This rationale is applicable to polymer "obtainable" by a stated process because any variation in any parameter within the scope of the claimed process would

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change the polymer produced. One who made or used a polymer made by a process other than the process cited in the claim would have to produce a polymer using all possible parameters within the scope of the claim, and then extensively analyze each product to determine if this polymer was obtainable by a process within the scope of the claimed process. See *Ex parte Tanksley*, 26 USPQ 2d 1389.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 10 and 11 are rejected under 35 U.S.C. 102(a) as being anticipated by Yamago et al. ("Organotellurium Compound as Novel Initiators for Controlled/Living radical Polymerizations. Synthesis of Functionalized Polystyrenes and End-Group Modifications", Journal of the American Chemical Society, 124 (12), 2874-2875, 2002.02.27).

With regard to the limitation of claims 1-4, 10 and 11, Yamago discloses the advantages of organotellurium compound compounds over nitroxides, e.g., more facile synthesis of tailor-made initiators and easy of polymer-end group modifications, would be highly useful in the synthesis and synthetic transformations of these compounds.

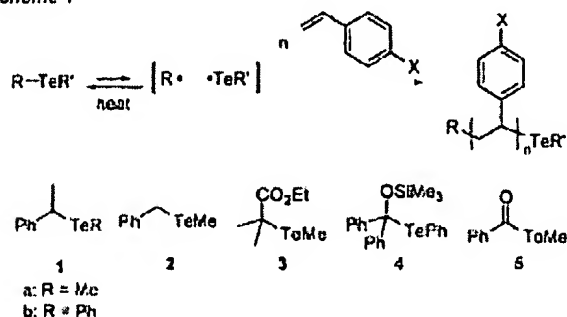
Yamago discloses several new organotellurium-based initiators for controlled/living radical polymerization of styrene derivatives that allows accurate weight

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control with defined end-groups, which can be transformed into a variety of end-group modified polystyrenes (page 2874, 2nd paragraph).

Yamago discloses bulk polymerization of styrene (X=H) with the polymeric-end mimetic initiator 1a (R=Me) initiated the polymerization efficiently, and afforded polystyrene with the predicted molecular weight and low polydispersity ($M_n = 9200$, PD = 1.17) in 96% yield (Table 1, entry 1).

Scheme 1

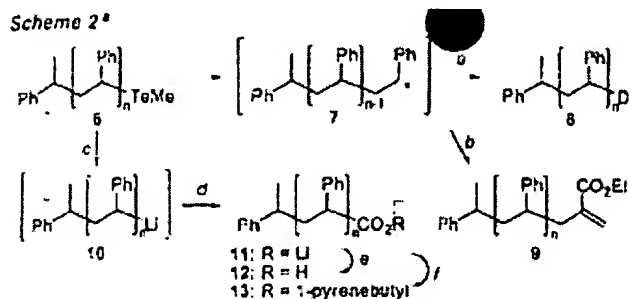
Table 1. Effects of Initiators for Polymerization of Styrene^a

entry	X	initiator	conversion (%)	M_n^b	PD ^c	BDE (kJ/mol) ^d
1	H	1a	96	9 200	1.17	123
2	H	1b	91	15 900	1.45	112
3	H	2	89	9 000	1.46	142
4	H	3	79	9 000	1.15	114
5	H	4	76	50 700	1.80	25
6	H	5	83	25 400	1.58	182
7 ^e	H	1a	78	35 700	1.21	
8 ^f	H	1a	84	62 600	1.30	
9	Cl	1a	88 ^g	3 800	1.41	
10	OMe	1a	94 ^h	10 900	1.17	

^a Bulk polymerization was carried out with 100 equiv of styrene at 105 °C for 16–18 h under a nitrogen atmosphere. ^b Molecular weight (M_n) and polydispersity (PD) were calibrated by size exclusion chromatography using polystyrene standards for samples after single precipitation from MeOH. ^c Bond dissociation energy of the initiator obtained by B3LYP DFT calculations with the LANL2DZ basis set for tellurium atom and the 6-31G(d) basis set for the rest. ^d The reaction was carried with 500 equiv of styrene. ^e The reaction was carried out with 1000 equiv of styrene. ^f The reaction was carried out at 100 °C for 17 h. ^g The reaction was carried out at 100 °C for 36 h.

It is the Examiner position, that organotellurium compounds of the above formulas 1a, 1b, 2 are substantially identical to the claimed formulas (1) and (4).

The initiators 1a and 3 promoted polymerization under much milder conditions. Molecular weight increased linearly with increase of styrene, and the products were obtained with low polydispersity (entries 7 and 8).



The “living” nature of the current polymerization was ascertained by several control experiments. First, the molecular weight (M_n) increased linearly with an increase in the amount of styrene used. Second, the molecular weight also increased linearly with an increase of the conversion of styrene. Third, a block copolymer was formed by the treatment of starting polystyrene block prepared from 1a and 100 equiv of styrene with 4-methoxystyrene (100 equiv). Finally, the high level of fidelity of the end-group was confirmed by labeling experiments. Thus, treatment of polymer block 6 prepared from 1a and 100 equiv of styrene with tributyltin deuteride afforded 8 quantitatively through the radical intermediate 7 (page 2875, 1st paragraph).

Therefore, all the limitations of the claims 1-4, 10 and 11 are expressly met by Yamago.

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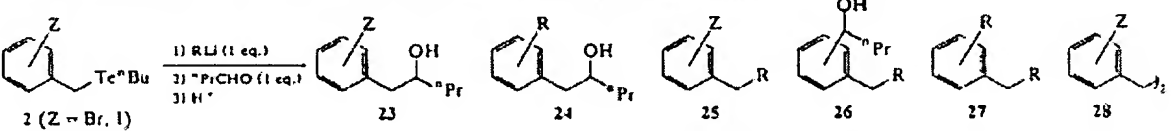
6. Claims 1-4, 10 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Kanda et al. ("Generation of allyl- and benzyllithiums from the corresponding halides by the aid of lithium-tellurium exchange reactions", Journal of Organometallic Chemistry, 473 (1994), 71-83).

Kanda discloses a variety of allyl- and benzyllithiums, which were prepared by lithium-tellurium exchange reactions of allylic and benzylic tellurides generated in situ from the corresponding halides (abstract).

Kanda discloses the reactions of benzylic tellurides having bromo and iodo substituents with organolithium reagents (page 74, Table 2).

TABLE 2. Reactions of benzylic tellurides having bromo and iodo substituents with organolithium reagents

TABLE 2. Reactions of benzylic tellurides having ortho and para substituents with organolithium reagents



2 (Z = Br, I)

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
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Run	telluride 2	RLi	temp(°)	solvent	gls(isolated) yields of products (%)	^a BuTeR					
					23	24	25	26	27	28	
1		ⁿ BuLi	-70	THF	(44) *	0	9	(33)	0	6	(55)
2		ⁿ BuLi	-70	Et ₂ O	79(68) *	0	2	0	0	< 1	70
3		ⁿ BuLi	-70	THF	(42)	0	0	(17)	0	0	(51)
4		ⁿ BuLi	-70	Et ₂ O	81(75)	0	2	0	0	< 1	82
5		ⁿ BuLi	-70	THF	(32)	0	6	(14)	0	5	(47)
6		ⁿ BuLi	-70	Et ₂ O	63(53)	0	5	2	0	8	76
7		ⁿ BuLi	-70	THF	5	28	0	0	51	0	(30)
8		ⁿ BuLi	-105	Et ₂ O	21	3	3	< 1	32	0	23
9		MeLi	-105	Et ₂ O	49	0	3	0	39	0	~ *
10		PhLi	-105	Et ₂ O	46	0	0	9	32 *	< 1	51

Conditions: benzylic tellurides 2 were prepared in THF (5 ml) from 1 (2 mmol), tellurium (2 mmol) and butyllithium (2 mmol, 1.6 M in hexane) and used without isolation. The exchange reactions were conducted using RLi (2 mmol) at the temperature indicated for 15 min and quenched with butanal (2 mmol). The solution was warmed to room temperature, washed with saturated NH₄Cl_{aq}, and the resulting mixture was analyzed by glc and/or NMR. Yields of 24, 26 and 27 are based on RLi used, and that of 28 on 2. ^a The product 23i in runs 1 and 2 is the same as 12. ^b Not determined. ^c NMR yield.

It is the Examiner position, that benzylic telluride compounds (telluride 2) are substantially identical to the claimed formulas (1) and (4).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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